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BIRDS AS PROTECTORS OF ORCHARDS.

BY EDWARD HOWE FORBUSH,
ORNITHOLOGIST, MASSACHUSETTS STATE BOARD OF AGRICULTURE.

FROM A BULLETIN OF THE MASSACHUSETTS STATE BOARD OF AGRICULTURE,
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By EDWARD HOWE FORBUSH,
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PREFACE TO THIRD EDITION.

This bulletin was published in 1895. The demand for it soon exhausted the supply. It was reprinted in the succeeding year, together with other bulletins of that year, but has been long out of print. The demand for literature of this character has induced the secretary of the Board of Agriculture to ask the ornithologist to prepare another edition, which is presented herewith.

Since this paper was written the common cankerworms have decreased in numbers until they are no longer regarded as pests of the first magnitude. How much of this decrease is attributable to birds the reader may judge.

E. H. F.

BIRDS AS PROTECTORS OF ORCHARDS.

BY E. H. FORBUSH, ORNITHOLOGIST, MASSACHUSETTS STATE BOARD OF AGRICULTURE.

While observing the food habits of birds during the last twenty years the writer has become convinced that they destroy enormous numbers of insects. This conviction gives rise to the question, To what extent are birds useful to man in this respect?

The present paper is merely a partial record of the results of an attempt to foster and protect birds in an old and neglected orchard, with a view to observing the effect of such a policy upon the trees. The orchard is so situated as to be a favorite haunt for birds. It forms part of an estate in Medford, Mass., lying near the southern border of the stretch of wooded rocky hills known as the "Middlesex Fells," a large part of which is now under the control of the Metropolitan Park Commission of Massachusetts, and is being administered as a forest reservation. The nearest estates on the east and west of the orchard are cultivated to some extent. There are other orchards in the immediate vicinity, and many large and fine shade trees. There are also on the estate in question many varieties of trees and shrubs. There is a small piece of woodland, covering perhaps an acre and a half, in which yellow pine predominates, the other trees being principally ash, oak and maple, some hickory and a few white pines. A lane running along the southern border of the place is flanked on both sides with elms and poplars. A line of mulberry trees along the lane south of the orchard affords tempting food for such birds as are fond of fruit in its season. There are also many wild cherries, and berries of several varieties, together with half a dozen trees of cultivated cherries.

Among the trees, shrubs and vines found here which furnish food for birds in the shape of berries or seeds at certain seasons of the year are the common barberry, Northern fox grape, poison ivy, wild yellow plum, wild red cherry, chokecherry, English cherry, black raspberry, high blackberry, garden raspberry, wild rose, common apple, common red currant, white ash, red mulberry, white oak, scarlet oak, white pine, pitch pine, hemlock and Virginia juniper or red cedar.

The orchard itself is a typical old orchard, such as is often found on small farms. It has suffered greatly from neglect. Two-thirds of the original trees have died or are in the last stages of dissolution. This is largely the result of neglect and improper pruning. Dead limbs and hollows in the trees have offered nesting places for such birds as the wren, woodpecker and bluebird.

For three years, from 1891 to 1893 inclusive, the trees were trimmed and cared for. They were sprayed or banded to protect them from cankerworms, and the " nests " of the tent caterpillar were removed. The result was a scanty yield of apples from most of the trees. One or two bore quite plentifully.

In order to observe the effect of the feeding of birds in the orchard, no care was taken in 1894 to protect the trees. During that year the tent caterpillars were very numerous in the vicinity, and it became evident also that a great increase in the number of cankerworms was taking place in the neighborhood. Although these insects made considerable inroads upon the trees, they did not seriously injure the foliage anywhere except in one or two instances. No attempt had been made previous to 1895 to foster or encourage the birds in the neighborhood, except that a few nesting boxes were put up in 1894, which were occupied in one case by a family of wrens and in another by the English or house sparrow. We were careful, however, to destroy the nests of this sparrow. In the fall of 1894 it was noticed that immense numbers of the wingless females of the fall cankerworm were ascending nearly all the trees and depositing their eggs; also, that the eggs of the tent caterpillar moths were numerous upon the twigs, promising a plentiful supply for 1895.

Having allowed the insects one year to increase unmolested by man, we began in the winter of 1894–95 to encourage the presence of birds in the orchard. In 1894 a small tree in the center of the orchard had been enclosed by a high board fence. The tree thus enclosed was used as an outdoor experiment station for observations on the breeding and habits of the gypsy moth. During the winter of 1894–95 Mr. C. E. Bailey made frequent visits to this tree, to ascertain whether or not the birds were destroying the eggs of the gypsy moth. Incidentally, Mr. Bailey observed many interesting things in connection with the feeding of birds on the eggs, larvæ and pupæ of insects which winter on the trees, and the writer is greatly indebted to him for many interesting notes on the feeding of birds in this orchard. He is a careful, conscientious observer, and is intimately acquainted with most of our native land birds.

Hunters and trappers are aware that many species of winter birds, such as titmice, woodpeckers, crows, jays and nuthatches are attracted by a skinned carcass suspended from a limb, and will remain in the vicinity until all the bones are picked clean, or until, with the approach of spring, insect food becomes more accessible.

The chickadees were seen feeding on the eggs of the fall cankerworm, and Mr. Bailey suspended pieces of meat, bone, suet, etc., from the trees to attract the birds to the orchard. These food materials are suitable for birds at times when the trees are covered with snow or ice, and when, lacking such nourishment, they might starve. Although birds will frequently visit bait provided for them, and in time will eat a considerable portion of the meat, they do not depend entirely on this aliment, but spend the greater part of their time in searching for insects and eggs in the immediate vicinity.

The chickadees, finding a plentiful supply of food, remained about the orchard most of the winter, except for a week or two, when the meat gave out; but they were lured back again later by a fresh supply which was placed in the trees. Not only were the chickadees attracted to the orchard in large numbers, but other birds came also. A pair of downy woodpeckers and two pairs of white-breasted nuthatches were frequent visitors, and a few brown creepers came occasionally. All these paid frequent visits to the meat and suet, and also thoroughly inspected the trees in search of insect food. They made excursions also to the trees in the neighborhood, but most of their attention was confined to the orchard in which the bait was suspended. As they became more accustomed to Mr. Bailey's presence they grew quite tame, and could be viewed at a distance of a few feet. Indeed, chickadees frequently alighted on his person and occasionally took food from his hand. He was able to determine accurately (without killing them) what they were feeding upon, and was soon convinced that they were destroying the eggs of the cankerworm moth in large numbers, as well as the hibernating larvæ and pupæ of other insects injurious to trees.

To determine how many eggs a single chickadee would eat, a few birds were killed and their stomach contents examined, with surprising results. There was no difficulty in identifying the eggs of the cankerworm moth which were found in the birds' stomachs, as a great portion of the shells remained intact. The other insect contents of the stomachs were identified for me through the kindness of Mr. A. H. Kirkland, then assistant entomologist to the State Board of Agriculture, who made the examinations. Although it was impossible in all cases to learn with certainty the species to which certain insects belonged, it was evident that they could be referred to genera known to be of injurious habits.

I take the following from Mr. Bailey's notes: —

Number of Eggs of the Fall Cankerworm found in Stomachs of Chickadees.

	Eggs.
No. 1,	273
No. 2,	261
No. 3,	216
No. 4,	278

Making in all 1,028 eggs found in the stomachs of four birds. Four birds killed later in the season had eaten the female imagoes of the spring cankerworm, as follows: —

	Moths.
No. 1,	41
No. 2,	18
No. 3,	27
No. 4,	19

Making a total of 105. In Nos. 2, 3 and 4 of the last table there were large numbers of eggs also. It is safe to say that there were 150 eggs in each stomach, in addition to the female moths eaten.

Mr. Bailey carefully counted the eggs in the ovaries of twenty of these female moths, with the following results: —

No. 1,	158	No. 11,	111
No. 2,	272	No. 12,	160
No. 3,	127	No. 13,	193
No. 4,	184	No. 14,	131
No. 5,	213	No. 15,	281
No. 6,	135	No. 16,	242
No. 7,	140	No. 17,	116
No. 8,	220	No. 18,	281
No. 9,	200	No. 19,	192
No. 10,	130	No. 20,	217

It will be seen from this table that the average number of eggs found in each moth is 185. Mr. Bailey is very positive, from his continuous field observations, that each chickadee will devour on the average 30 female cankerworm moths per day from the 20th of March until the 15th of April, provided these insects are plentiful. If the average number of eggs laid by each female is 185, one chickadee would thus destroy in one day 5,550 eggs; and in the twenty-five days in which the cankerworm moths "run" or crawl up the trees, 138,750. It may be thought that this computation is excessive, and it is probable that some of the moths were not captured until they had laid some of their eggs, but the chickadees eat these eggs also. When we consider further that the remains of 41 of these insects were found at one time in the stomach of one chickadee, and that the digestion of the bird is so rapid that its stomach was probably filled many times daily, the estimate made by Mr. Bailey seems a very conservative one. He now regards the chickadee as the best feathered friend of the farmer, for it is with us all the year, and there is no bird that can compare with it in destroying the female moths and their eggs. It was noticed that the birds made no attempt to catch the male moths. This, however, cannot be considered as a fault, for the birds accomplish far more by destroying the females than they would by killing males.

The following notes from preliminary examinations of the contents of the alimentary canals of chickadees made by Mr. Kirkland are of interest in this connection: —

Bird brought in by Mr. Bailey, March 16, 1895. Gullet empty. Gizzard contained 270 cankerworm eggs, 46 case-bearers (microlepidoptera), 6 cocoons of a small tineid (near *Aspidisca*). These three kinds of food in bulk composed 80 per cent of the gizzard contents, the remainder being dark material which I was unable to determine under a hand lens. I think it very probable that part of this was bits of bark or particles of bark dust taken in with the eggs or cocoons. The intestine contained a large quantity of meat, 75 per cent; and 103 cankerworm eggs, 10 per cent; the remainder, 15 per cent, being material which I could not identify, — it was not meat. This gives us, as totals, 373 cankerworm eggs and 52 microlepidoptera.

Specimen of so-called " scales " on apple twigs brought in by Mr. Bailey, March 12, 1895. These are not bark lice, but the cocoons of a microlepidopteron, probably a tineid. Length, 1/12 to 1/8 inch; width, 1/12 to 1/10 inch; elliptical, dark brown or reddish brown. They are closely spun, the upper surface apparently being of leaf epidermis, while underneath is a small, well-formed cocoon, which contains a minute green larva which evidently hibernates as such, probably pupating in the spring. The larva undoubtedly feeds on the leaves of the apple tree, as these cocoons were taken from the small twigs at the extreme end of a large branch. Some of these cocoons are empty and have a minute hole at one end, which probably served for the egress of some small parasite. These cocoons are eaten by the chickadee, and have been found in the gizzards of the birds.

The case-bearers and the tineids or leaf miners are injurious to the foliage of the apple trees.

It was noticed by Mr. Bailey, who watched the birds closely for several days, that they were eating quantities of both of these insects. It would have been impossible for any one to determine the species of the leaf miners as found in the birds' stomachs, for little remained but small fragments of the shell of the creature. Mr. Bailey noticed that the birds were taking objects from the twigs, some of which they ate; others they rejected and dropped upon the snow. Some of those dropped he picked up and examined, finding them to be parasitized and dead. The birds undoubtedly ate only those which were alive.

It was evident from a careful examination of the eggs found in the stomachs of the chickadees that they were either broken by the bill in such a way that the contents were exposed to the action of the gastric juice or the gastric fluid destroyed a portion of the shell. Occasionally a few eggs which appeared to be whole were found in the intestines.[1]

A great quantity of animal food is required to sustain life and provide animal heat sufficient to enable these little birds to resist the inclemency of our severe winters. In proof of this it may be stated that during favorable weather the birds visited the meat and ate largely of it three times each hour with fair regularity. During each interval they were occupied in destroying eggs and other hibernating insect forms which were always present and numerous in the stomachs examined. This feeding appeared to be almost continuous except in severe storms, when the birds sought shelter, or when they were laboring under excitement caused by fear, as in the case of a visit from a hawk, cat or shrike. Whenever a cat appeared they immediately hid behind the branches and remained quiet until the intruder had passed. The appearance of other enemies or the firing of a gun would produce much the same effect.

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[1] In later experiments it was proved that eggs which passed through a bird apparently uninjured were really dead. They had been killed by the gastric juice, if not emptied of their contents.

The woodpeckers and nuthatches which frequented the orchards were not seen to eat the eggs of the cankerworm moth. As they were not numerous, none were killed. Mr. Bailey observed, however, that the nuthatches were eating many scales which they found on the limbs of the apple trees in a neighboring orchard. In relation to these scales the following note from Mr. Kirkland is of interest: —

> March 20, 1895. Mr. Bailey brought in specimens of apple twigs infested with the bark scale louse. He reported that the nuthatch was feeding on them. These twigs were infested in a worse manner than I have ever seen before. They were literally covered with the scales. On one small twig, one-half inch in diameter, I counted 367 scales on one inch of the twig. The eggs contained in a number of scales varied from 62 to 83, with an average of 70.[1]

These scales, when numerous, are very injurious to the apple tree. Each scale covered a dead female of the preceding year and the hibernating eggs, many of which must have been disposed of by the nuthatches. It was shown, both by observation and dissection, that birds feeding in the same neighborhood and upon the same trees showed considerable variation in the character of their food. Kinglets taken had no cankerworm eggs, but had eaten largely of destructive bark borers. Woodpeckers seemed to confine themselves to the larvæ of borers and to wood ants and other insects which bore into the wood of the tree. Chickadees and nuthatches ate the pupæ and eggs of insects found upon the bark or in the crevices of the trunks. No birds were seen to eat the eggs of the tent caterpillar, nor were any found in the stomachs of any of the birds examined. It seems probable that these eggs are so protected by a hard covering that they are not eaten by most birds; but Dr. J. A. Allen reports that the blue jay eats them.[2]

It is impossible, in the limited space at command, to report results of all observations and dissections in detail. It is feasible merely to give the apparent results of the presence of the birds in the orchard. These birds were not only destroying the eggs of the cankerworm in this orchard, but were feeding on the eggs of the same insect in the woods where bait had been suspended.

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[1] The oyster-shell bark louse is the species eaten.

[2] Since the above was written, several species, including the chickadee, have been observed to eat these eggs.

As the frost left the ground on the first warm days of spring the wingless females of the spring cankerworm moth appeared in the orchard and began ascending the trees in great numbers. The chickadees commenced catching and eating the females and their eggs. Mr. Bailey placed 22 of the females on one tree, and in a few minutes 20 of them were captured and eaten by chickadees.

As spring approached and insects became more numerous, the chickadees came very seldom to the meat. They were not as assiduous in their attention to the orchard, and a small portion of their food consisted of the early gnats which flew on bright sunny days. In early April they had nearly deserted the meat, although they still frequented the orchard in search of the female cankerworm moths. They seemed to prefer animal food to all other, and even in cold weather would hardly notice grain or seeds of any kind, though one individual ate a few oat kernels which were placed near his accustomed feed of meat.

Towards the last of April the English or house sparrow began to make its appearance in the vicinity and apparently drove the chickadees to the woods, as they disappeared and did not nest in the orchard, but remained in the woods, where they paired and nested.

The English sparrow is largely responsible for the fact that chickadees are not now found nesting in our orchards. Though they still nest in the orchards on the remoter farms and in the villages where the English sparrow is not numerous, they seem to have disappeared in summer from orchards near cities. At the time of the advent of the sparrow in this locality, chickadees were often found nesting in old apple trees in the orchards in this region where now scarcely any are to be seen in orchards during the summer.

In the latter part of April and in early May tent caterpillars made their appearance on the apple and cherry trees in the neighborhood. Cankerworms were also numerous on the apples and elms, and appeared in some of the other trees.

It was noticed, however, that, while trees in neighboring orchards were seriously infested with cankerworms and to a less degree with tent caterpillars, those in the orchard which had been frequented by the chickadees during the winter and spring were not seriously infested, but that comparatively few of the worms and caterpillars were to be found there.

With the warm south winds of May, many summer birds came, settled in the neighborhood and prepared to build their nests, among which the following were seen: chickadee, tree sparrow, crow, bronze grackle, flicker, red-winged blackbird, robin, chipping sparrow, oven-bird, wood thrush, catbird, brown thrasher, black-billed cuckoo, yellow-billed cuckoo, black and white warbler, yellow warbler, chestnut-sided warbler, black-throated green warbler, pine warbler, house wren, American redstart, Nashville warbler, golden-winged warbler, scarlet tanager, rose-breasted grosbeak, Baltimore oriole, blue jay, least flycatcher, wood pewee, phœbe, kingbird and downy woodpecker.

It was noticeable that early in the season, when the webs of the tent caterpillar first appeared on the apple and cherry trees, the orioles attacked them and devoured a considerable number of the hairy young larvæ. A little later, when the cankerworms became more numerous, it seemed as if all the birds in the neighborhood were intent on eating cankerworms, neglecting to a certain extent the hairy caterpillars. The cuckoos, however, seemed to feed impartially on both the cankerworm and the tent caterpillar.

Birds from all quarters in the wood and swamp, orchard and field, flocked into the trees infested by cankerworms, and there spent a considerable portion of their time. In a short time the few cankerworms remaining in the old orchard were apparently eaten by birds, and the birds then directed their attention to the neighboring orchards, which were swarming with the worms. It soon became evident that these orchards would be entirely stripped of their leaves, while the old orchard retained its full foliage. Thus it was seen that the trees to which the chickadees had been lured during the winter had been so well protected that the summer birds were able to destroy the few remaining larvæ, while the trees at a distance from these contained so many larvæ that the birds were not numerous enough to dispose of them or to make any effective reduction in their numbers. This apparently demonstrated the usefulness of the egg-destroying winter birds, and showed the wisdom of attracting them to the orchard during the winter months. Not only did nearly all species of birds in the neighborhood flock to the trees infested by the cankerworms, but the chickadees living in their retirement in the woods came out to the orchards, flying some distance to procure cankerworms with which to feed their young, and making regular trips to the infested trees day after day.

On May 18 Mr. Bailey saw a female chickadee carry 20 larvæ to its nest. They were apparently all cankerworms but 2, which were tent caterpillars. Of this he is certain, for he was within three yards of the nest to which the larvæ were taken. Later, on May 31, he noticed the chickadees feeding their young. It was evident that a large portion of the food consisted of cankerworms. Each bird made a trip to the nest about once in twelve minutes. The male and female came at nearly the same time and went away together. They went in the direction of an orchard infested by cankerworms. A few of the larvæ were dropped on the ground at the nest, and proved, on examination, to be cankerworms.

The crow was also observed feeding on cankerworms.

On May 22 the birds had nearly all stopped feeding in the neighboring woods and were in the orchards feeding on cankerworms. Early in June, when the remaining cankerworms had finished their transformations and retired to the ground, several species of birds were again noticed feeding their young on the tent larvæ and other hairy caterpillars. Of these, three species (both cuckoos and the Baltimore oriole) seemed to be the most useful. On May 17 a cuckoo was seen to take 11 caterpillars out of one "tent." Mr. Bailey writes: —

> On May 10 a black-billed cuckoo came into a tree near me at 3 P.M. and sat there until 4.40 P.M., then he went straight to a tent caterpillars' nest. He looked it over for a short time and then commenced eating the caterpillars. He picked 27 caterpillars out of

the nest before he stopped. The bird ate them all, and did not drop one. Then he went to the tree, in which I believe he remained during the night, for on Saturday, the 11th, I found the bird in the same tree and in almost the same place at 5 A.M.

The orioles, chickadees and vireos often pecked the caterpillars to pieces and ate portions of them, seemingly feeding to a considerable extent on the internal organs. This being the case, it is quite evident that the stomach contents cannot be depended upon entirely to determine the character of the food of these birds, as no one is expert enough to identify the internal organs of caterpillars with such certainty as to determine the species to which they belong.

The following is a list of the birds seen feeding on the tent caterpillar: crow, chickadee, oriole, red-eyed vireo, yellow-billed cuckoo, black-billed cuckoo, chipping sparrow and yellow warbler.

During the month of May an attempt was made to render the place as attractive to birds as possible. The undergrowth, which previous to 1894 had been trimmed out, was afterward allowed to grow, and in 1895 several low thickets had been thus formed; the mulberry trees were stimulated by judicious trimming, and bore a considerable crop of early fruit which ripened in advance of the cherries, thus drawing the attention of the fruit-eating birds away from the cherries, and serving to attract them to the vicinity of the orchard. Ten nesting boxes were put up for the wrens and bluebirds; but as the bluebirds were very rare this season, none came to the orchard.[1] Two families of wrens, however, were reared in the boxes in place of one family in 1894. Nesting materials — strings, hair and straw — were hung in the trees and scattered about. Several marauding cats were killed, and an attempt was made to keep nest-hunting boys away from the neighborhood as much as possible. Thirty-six nests of birds were discovered in the neighborhood, as follows: three red-eyed vireos, ten robins, four Baltimore orioles, three cuckoos, five chipping sparrows, three least flycatchers, two redstarts, two yellow warblers, two chickadees and two house wrens.

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[1] The winter of 1894–95 was very destructive to bluebirds in the South.

Of these, all but three were destroyed, probably by boys, the nests being torn down and the eggs missing. The three which escaped destruction were two wrens' nests which had been built in boxes upon buildings, and a robin's nest in a maple tree within ten feet of a chamber window. This wholesale destruction of nests discouraged several pairs of birds, and they disappeared from the neighborhood. Those remaining built new nests, and after a second or third attempt a few succeeded in rearing young. One nest of orioles escaped the general destruction, and the birds were busy for a long time carrying cankerworms to their young. One of them was noticed to take 11 cankerworms in its beak at one time and fly with them to the nest. The vireos, warblers, chickadees, cuckoos, orioles and chipping sparrows were particularly active in catching cankerworms, and the English sparrow killed them in considerable numbers.

If the thirty-six pairs of birds whose nests were found had succeeded in raising their young, it is probable that they would have disposed of most of the cankerworms in the neighborhood. Five thousand of these larvæ are sufficient to strip a large apple tree. One hundred and eight young would have been reared, had each pair of birds raised three. According to Professor Aughey's experience, 60 insects per day as food for each bird, both young and old, would be a very low estimate.[1] Suppose each of these 108 birds had received its 60 insects per day, there would have been 6,480 caterpillars destroyed daily. The destruction of this number of caterpillars would be enough to save the foliage and fruitage of one apple tree. In thirty days the foliage of thirty apple trees could have been saved, or 194,400 cankerworms destroyed. This does not include what the old birds themselves would have eaten.

In these observations the influence of insect parasites and predaceous insects has not been entirely ignored. Hymenopterous parasites were not seen to be numerous, and, as it was a year when cankerworms were on the increase, it is not probable that these parasites would have been a prime force in reducing the numbers of the cankerworms had the birds not been present. Even had they been numerous, they would have had little effect in checking the ravages of the cankerworm during the present year, as their interest is identical with that of the cankerworm, and they remain in its body until it has finished feeding, allowing it to defoliate the trees before completing their deadly work upon it.

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[1] First Report United States Entomological Commission, 1877, p. 342.

We do not know to what extent such parasites are devoured by birds. This we could not ascertain without shooting the birds, which would have defeated our main object. No parasites of the tent caterpillar or cankerworm were found in the stomachs of the few birds which were examined. It is hardly safe to draw conclusions from observations so limited in their scope; but we may infer, from what was observed, that the egg-eating birds are of the greatest value to the farmer, as they feed almost entirely on injurious insects and their eggs, and are present all winter when other birds are absent. The summer birds which attack the larvæ are valuable also, if they can be so protected and fostered as to become sufficiently numerous to do the work required. It is evident also that a diversity of plants which encourages diversified insect life and assures an abundance of fruits and seeds, as an attraction to birds, will insure their presence. In this connection I wish particularly to note the fact that the mulberry trees, which ripen their berries in June, proved to be a protection to the cultivated cherries, as the fruit-eating birds seemed to prefer them to the cherries, perhaps because they ripen somewhat earlier.

I believe it would be wise for the farmer to plant rows of these trees near his orchard, and it is possible that the early June berry or shad berry might also be useful in this respect. It is a handsome shrub or tree, flowering early in the season, and would be attractive at a time when other trees and shrubs are not in bloom.

At the present time (July 23, 1895), the trees in the orchard appear to be in good condition. They have not suffered from the slight pruning of their foliage which was effected by the few caterpillars and cankerworms which survived. The fruit is well set, and it now remains to be seen whether the birds will have any considerable effect in preventing the ravages of the codling moth. No other orchard in the neighborhood will produce any fruit this season, with one exception. The nearest orchard, situated directly opposite on the estate across the way, has not been ravaged by the cankerworms. This exemption is due principally to the efforts of the owner, who has banded his trees with tarred paper and has used tree ink faithfully and well upon the paper. He has also taken pains to clear the nests of the tent caterpillar from the trees. This orchard, being nearest to the one visited by the chickadees, was also an object of their attention, and this may account somewhat for the reduction of the pests in this place.

The record of these observations, incomplete as it is, is given for what it is worth as a contribution to the literature on this most interesting and important subject.

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